IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	: Dureseti CHIDAMBARRAO, et al.	Group Art Unit: 2814
Appln. No.	: 10/605,108	Examiner: PHAM, Long
Filed	: September 9, 2003	Confirmation No. 2107
For	: METHOD FOR REDUCED N+ DIFFUSION IN STRAINED SI ON SI/GE SUBSTRATE	

REQUEST FOR PRE-APPEAL BRIEF REVIEW

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Window, Mail Stop AF
Randolph Building
401 Dulany Street
Alexandria, VA 22314
Sir:

This request is being filed concurrently with a Notice of Appeal and is responsive to the Final Official Action of June 8, 2006.

Reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection is respectfully requested in view of the following remarks.

A prima facie case of unpatentability has not been set forth and the Rejection Under 35 U.S.C. § 103(a) Is Improper

Examiner's Assertion

In support of the obviousness rejection of independent claims 16, 38 and 39 over Applicant's Admitted Prior Art (AAPA) in view of U.S. Patent No. 6,200,836 to YOO, the Examiner asserts that AAPA discloses all of the features recited in these claims except for ion implanting an interstitial element onto the source and drain extension regions and forming low-vacancy regions that substantially overlap the source and drain extension regions, but explains that this feature is taught in YOO.

Applicant's Response

Applicant respectfully disagrees that YOO discloses the feature(s) acknowledged to be missing in AAPA.

Independent claim 16 recites, among other things:

ion implanting an interstitial element into the source and drain extension regions to reduce vacancy concentration in the source and drain extension regions and to form low-vacancy regions that substantially overlap the source and drain extension regions.

Furthermore, independent claim 38 recites, among other things:

forming sidewalls on sides of the gate electrode; and
ion implanting an interstitial element into the source and drain extension regions to reduce vacancy concentration in the source and drain extension regions,
wherein the ion implanting occurs after the sidewalls are formed.

Finally, independent claim 39 recites, among other things:

forming sidewalls on sides of the gate electrode;
reducing a vacancy concentration in the source and drain extension regions using ion implantation in order to annihilate excess vacancies or trap vacancies,
wherein the reducing occurs after the sidewalls are formed and forms low-vacancy regions that substantially overlap the source and drain extension regions.

While it is true that YOO discloses implanting oxygen 30 to the regions 16 and 18 in order to form oxide layers 38 and source and drain regions 32 (see Figs. 2 and 3), in addition to failing to disclose the recited SiGe substrate (col. 3, line 44 of YOO explains only that layer 12 is a gate oxide), YOO fails to disclose, or even suggest, ion implanting an interstitial element into the source and drain extension regions to reduce vacancy concentration in the source and drain extension regions and to form low-vacancy regions that substantially overlap the source and drain extension regions. To the contrary, Fig. 2 of YOO shows that the oxygen implantation is focused onto only a tiny portion of the regions 16 and 18. Furthermore, Fig. 3 shows that the resulting barrier 38 only overlaps, if at all, a small portion of the source/drain regions 32. As such, YOO clearly fails to disclose that the oxygen implantation 30 forms low-vacancy regions that substantially overlap the source and drain extension regions (claims 16 and 39), that is, that overlap nearly all of the source and drain regions 32, much less, source/drain extension regions 34 and 36.

Furthermore, because YOO discloses that the oxygen implantation occurs at an angle of between 30 and 60 degrees (see col. 4, line 4-7) and at a dose that is only in the

range of $1x10^{12}$ to $1x10^{13}$ atoms/cm^3 (see col. 4, lines 1-4), it is not apparent that such an implantation step would result in the formation of low-vacancy regions that substantially overlap the source and drain extension regions. Applicant reminds the Examiner that the ion implantation of the invention occurs at higher concentrations such as, e.g., $1x10^{14}$ to $1x10^{16}$ atoms/cm^2, that Fig. 4 of the instant application clearly shows that the ion implantation B occurs over most of the source/drain extension regions 24, and that, as a result, the low-vacancy regions 26 substantially overlap the source and drain extension regions 24.

Examiner's Assertion

In rejecting claim 38, the Examiner acknowledges that AAPA fails to disclose forming sidewalls on sides of the gate electrode, but explains that this is taught in YOO.

Applicant's Response

Applicant respectfully disagrees. While it is true that YOO discloses the step of forming the sidewalls 33 (see Fig. 3), it is clear from the description of Figs. 2 and 3 (as well as the drawings themselves), that the oxygen implantation 30 occurs before the sidewalls 33 are formed. Claim 38, on the other hand, recites that the ion implanting occurs after the sidewalls are formed. Furthermore, the Examiner has failed to identified any disclosure in YOO which discloses or suggest that the steps shown Figs. 2 and 3 of YOO (which clearly show that the ion implanting occurs before the sidewalls are formed) could be reversed.

Examiner's Assertion

In support of the above-noted obviousness rejection, the Examiner merely concludes that there is a basis for combining the teachings of AAPA and YOO.

Applicant's Response

This is improper. The Examiner has failed to identify any prior art that provides the requisite motivation or basis for combining the teachings of AAPA and YOO. In establishing a *prima facie* case of obviousness under 35 U.S.C. § 103, it is incumbent upon the Examiner to provide a reason *why* one of ordinary skill in the art would have found it obvious to modify a prior art reference or to combine reference teachings to arrive at the claimed invention. *See Ex parte Clapp*, 227 USPQ 972 (B.P.A.I. 1985) To

this end, the requisite motivation must stem from some teaching, suggestion or inference in the prior art as a whole or from the knowledge generally available to one of ordinary skill in the art and not from Applicant's disclosure. See, for example, *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). As explained in the Rule 1.116 Response, AAPA and YOO are directed to different methods of making CMOS devices. Moreover, YOO fails to teach or suggest both the missing features of AAPA and the motivation or basis for modifying the structure or process of AAPA in the manner asserted by the Examiner.

As such, YOO simply cannot cure the noted deficiencies of AAPA (even assuming the Examiner's characterization of the AAPA is correct - which Applicant disputes). Again, YOO clearly fails to disclose, or even suggest, that the disclosed implanting of oxygen is suggestive of ion implanting an interstitial element into the source and drain extension regions to reduce vacancy concentration in the source and drain extension regions and to form low-vacancy regions that substantially overlap the source and drain extension regions and/or that that the ion implanting occurs after the sidewalls are formed. Again, the actual disclosure of YOO teaches away from these features by implanting oxygen to only a portion of the regions 32 and by performing the implantation before the sidewalls are formed.

Applicant also takes issue with the Examiner's assertions that the resulting low-vacancy regions formed by the combination of AAPA and YOO "would inherently and substantially overlap the source and drain extension regions." Such assertions are entirely unsupported by the disclosure of the applied prior art. As explained above, YOO merely discloses that the oxygen implantation occurs at an angle of between 30 and 60 degrees (see col. 4, line 4-7) and at a dose that is only in the range of $1x10^{12}$ to $1x10^{13}$ atoms/cm^3 (see col. 4, lines 1-4). Moreover, Fig. 3 shows that the implantation results only in "a firm barrier 38" formed in regions 32. The invention, on the other hand, provides that the ion implantation occurs at higher concentrations such as, e.g., $1x10^{14}$ to $1x10^{16}$ atoms/cm^2. Moreover, Fig. 4 of the instant application clearly shows that the ion implantation B is focused over most of the regions 24 rather than only a portion of regions 16 and 18 (see Fig. 2 of YOO). Whereas the invention results in the low-vacancy regions 26 substantially overlapping the source and drain extension regions 24,

the steps shown in Figs. 2 and 3 of YOO result in "oxide layers 38 at the interface between the source/drain regions 32 and the surrounding silicon substrate" (emphasis added). Thus, it is not inherent from the disclosure of YOO that such an implantation step would result the formation of low-vacancy regions that substantially overlap the source and drain extension regions.

Examiner's Assertion

In the Advisory Action of August 16, 2006, the Examiner asserts that a *prima facie* case of obviousness has been established because the claimed invention is "identical or substantially identical" to that of the applied prior art.

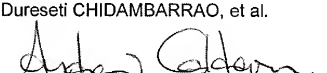
Applicant's Response

This is not correct. The invention provides for ion implanting an interstitial element into the source and drain extension regions to reduce vacancy concentration in the source and drain extension regions. Fig. 2 of YOO, in contrast, shows that the oxygen implantation is focused onto only a tiny portion of the source/drain regions 16 and 18. Furthermore, the invention results in a device wherein the low-vacancy regions 26 substantially overlapping the source and drain extension regions 24. On the other hand, the steps shown in Figs. 2 and 3 of YOO result in "oxide layers 38 at the interface between the source/drain regions 32 and the surrounding silicon substrate" (emphasis added). Thus, the Examiner is not correct that the claimed invention is "identical or substantially identical" to that of the applied prior art.

CONCLUSION

Reconsideration of the Final Office Action and allowance of the present application and all the claims therein are respectfully requested and now believed to be appropriate.

Respectfully submitted,
Dureseti CHIDAMBARRAO, et al.



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